1.0 VOLUME II ACCREDITATION SUPPORT PACKAGE DESCRIPTION

The Volume II accreditation support document contributes to logical verification and face validation activities by providing software design information and the results of sensitivity analyses that address model functionality. Assumptions and limitations inherent in the model design can be found in the CMS in Section 2.0, and errors found as a result of exercising the functional elements of the model over ranges of input conditions are reported in the Sensitivity Analysis results of Section 3.0. Other V&V activities that contribute to expert reviews in support of accreditation (e.g., input data V&V, comparison of model outputs with assessments or best estimates, and review of model assumptions, limitations, and errors) are described in [8]. Because such expert reviews generally apply to a specific application, their results are often reported in the accreditation report for that application, but allowance for their inclusion in ASP-II has also been made to benefit subsequent similar efforts by other users.

1.1 CONCEPTUAL MODEL SPECIFICATION

Translation of software functional requirements into design and then into code is a critical aspect of development, especially for complex simulations that will be used to make predictions. The purpose of design specifications is to identify and describe implementation methods used along with inherent assumptions, limitations, and approximations deemed necessary to simulate or model the required functionality or phenomena. Furthermore, the specification of design requirements and design elements is critical to the detailed verification process, which examines and tests each one in order to verify the implementation.

The CMS contributes to logical verification efforts by providing the user with a detailed description of the model design requirements, approach, and implementation, as well as limitations, assumptions, and approximations at the functional element (FE) level. This information should allow the model user to determine the range of applications for which the model can be reasonably expected to produce valid results. It remains for the user, of course, to compare this range with that required for the application at hand, and to make a determination of model suitability.

1.2 SENSITIVITY ANALYSIS

Sensitivity analyses are performed to examine functional performance of an FE over a range of input conditions. The purpose is to define or establish behavior of the function and its relative contribution to outputs generated by the model or simulation. It also serves to define data requirements, accuracies, and rates necessary to validate the function. Because the results of such analyses often illustrate expected or reasonable performance, they are often conducted during the process of reviews intended to establish face validity.

ASP-II contributes to face validation by providing the results of detailed sensitivity analyses performed on the model and each of its functional elements. To complete face validation, it remains for the user to perform input data V&V, to compare model outputs with acceptable results (e.g., from intelligence sources or other models), and to review all of these with respect to model acceptability criteria that are dependent upon the intended application.

1.3 LOGICAL VERIFICATION

Logical verification is an analysis activity that results in assessments of code implementation. It is similar in nature to desk checking activities associated with detailed code verification, but typically not performed at the same level of detail. Consisting of reviews of available design documentation and appropriate portions of the code, it is aimed at determinations of whether inherent assumptions and approximations are consistent with user requirements. When performed in conjunction with software development activities, logical verification is often accomplished incrementally, as critical portions or modules are completed and tested. When conducted as part of an accreditation support effort or on legacy codes, it is often performed with application specific requirements in mind and the level of examination can be very detailed in certain code areas. During such reviews, Computer-aided Software Engineering (CASE) tools are often used to aid in understanding the code (especially in the absence of documentation) as well as to document design features and/or limitations.

Reviews that take advantage of ASP documentation will be focused on the CMS sections for those FEs deemed critical for proper implementation of user requirements. Software testing of modules may also be accomplished to verify suspected errors or problems and reports of findings produced to support higher level assessments and accreditation decisions. Capturing these results in ASP-II extends their benefits beyond current accreditation (or development) efforts by allowing all other and subsequent reviewers to leverage their findings and recommendations.

1.4 FACE VALIDATION

Face validation is an analysis activity that results in assessments of credibility based upon model outputs for well defined input and operating conditions. It is usually accomplished by SMEs who have detailed knowledge of real world results of the phenomena being modeled. Their review typically addresses input data sources, input scenarios or conditions, and an analysis of model outputs relative to known or believed outcomes from similar situations. Face validation is not results or performance validation in the classical sense, but it provides a stronger endorsement of the model or a more authoritative statement of model credibility than the mere fact that a model is widely used and accepted. While expert opinion has been the traditional validation method of choice, its value is contingent upon the independence and level of expertise of the reviewers, and the scope of the review itself.

Face validation reviews usually include (but are not limited to) results of the following activities:

- Input data verification, consisting of a review of model input data sources and consistency of definition of how the data were collected, as well as a clear definition of how the data are used in the model;
- Input data validation, consisting of a comparison of user input and embedded data to the corresponding known (or best estimate) real world values;
- Comparison of model outputs with intelligence data or analyses, and/or known or best estimates of real world values for corresponding phenomena, and;

- Functional and/or model level sensitivity analyses.

1.5 DOCUMENT ORGANIZATION

Section 2 contains the software design requirements and specifications for the Platform, Environment, and Command, Control, and Communications (C3) FEs that are listed in the FAT in Appendix A. The sections are numbered according to their order of appearance, but the FE designators that appear at the top of each page correspond to those in the FAT. A cross-reference matrix is presented in Table 1.0-1. Decomposition of Suppressor into generic, identifiable FEs that correspond to real-world platforms with their constituent attributes and subsystems, physical and man-made environments, and C3 capabilities formed the basis for the FAT, and provides a framework for reporting results and comparing functionality among similar models.

The scope of this documentation task was limited to a high-level FE CMS only and includes top-level design requirements, design approaches, and software descriptions. The design approaches are not appropriate for detailed verification but should be adequate for logical verification by SMEs. In addition, Sections 3, 4, and 5, which are Sensitivity Analyses, Logical Verification Results, and Face Validation Results, respectively, are not available in this edition.

TABLE 1.0-1. Functional Element Cross Reference Matrix.

FUNCTIONAL AREA	#	FUNCTIONAL ELEMENT	2.0 CMS
I Platform			
		1.0 Attributes	
	1	1.1 Configuration	2.1
	2	1.2 Movement	2.2
	3	1.3 Signatures (EO/IR/RF/UV)	2.3
	4	1.4 Vulnerability	2.4
	5	2.0 Sensors	2.5
	6	3.0 Weapons	2.6
	7	4.0 Comm Devices	2.7
	8	5.0 CM/CCM	2.8
		6.0 Decision Making Elements	
	9	6.1 Capabilities	2.9
	10	6.2 Knowledge Base	2.10
	11	6.3 Logic Processes	2.11
II Environment			
	12	1.0 Atmospheric Characteristics	2.12
	13	2.0 Topographic Characteristics	2.13
	14	3.0 Bathymetric Characteristics	N/A
III Command Control and Communications (C^3)			
	15	1.0 Command Chain Hierarchy	2.15
	16	2.0 Network Communications	2.16
	17	3.0 Areas of Interest/Responsibility	2.17